



STATUS OF THE
EV-Smart Grid Interoperability Centers
in Europe and the U.S.

Keith Hardy
EV-Smart Grid Interoperability Center
Argonne National Laboratory

9th US-CHINA
Electric Vehicle and Battery Technology Workshop



Transatlantic Agreement established interoperability centers

U.S. DEPARTMENT OF
ENERGY

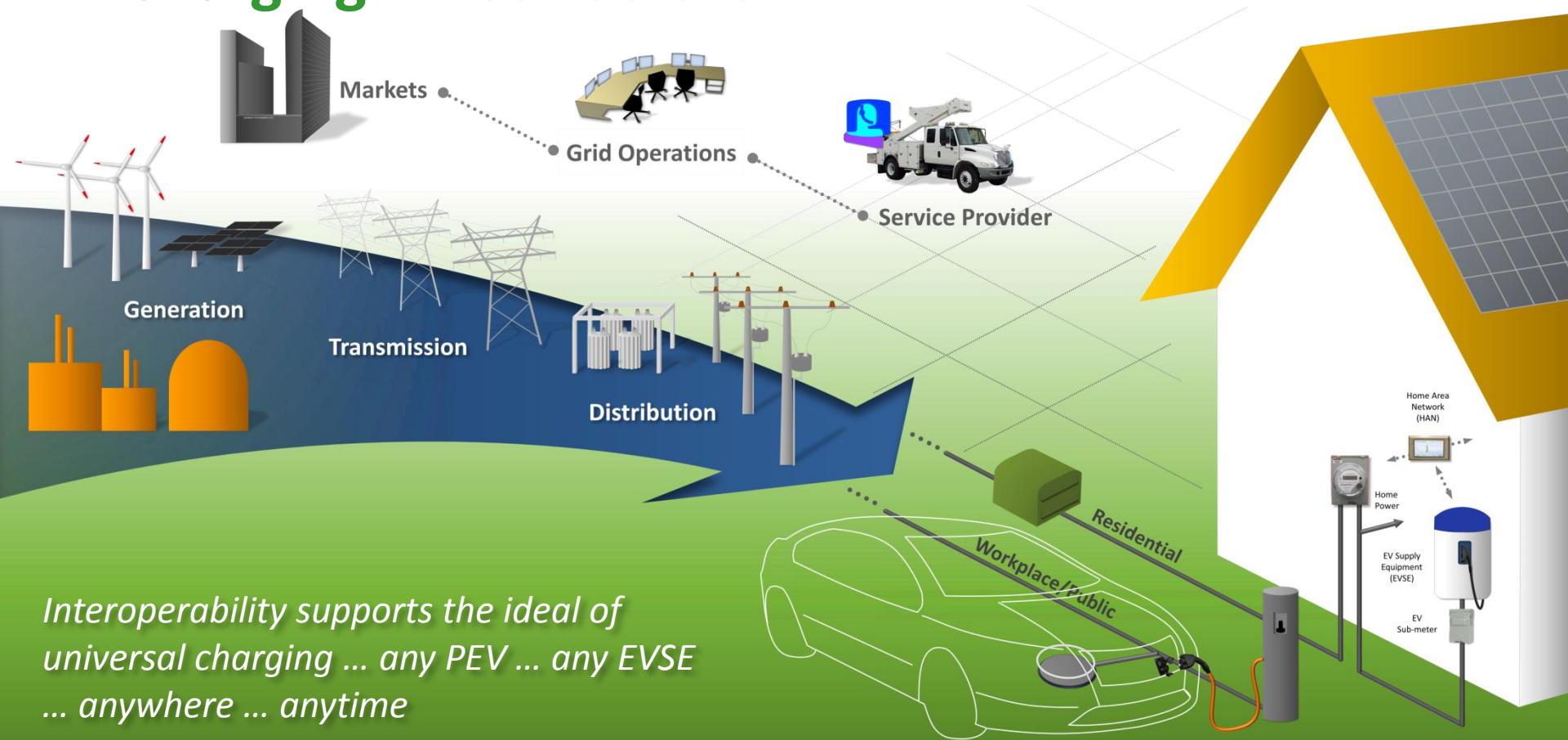
US State Department, November, 2011

Facilitated by the EU-US Energy Council and the Transatlantic Economic Council

- E-mobility is a common growth area
- Share manufacturers and suppliers
- ... **to promote global harmonization**
- Standards and technology for PEV-grid connectivity and communication
- Laboratory test procedures for PEVs, batteries and interoperability

Harmonization minimizes trade barriers, builds consumer confidence and facilitates adoption of new technology

EV Charging infrastructure



Interoperability

Capability of devices that conform to standards to function as intended with each other without special effort by the user

Global Interoperability requires ...



Argonne National Laboratory

EV-Smart Grid Interoperability Center

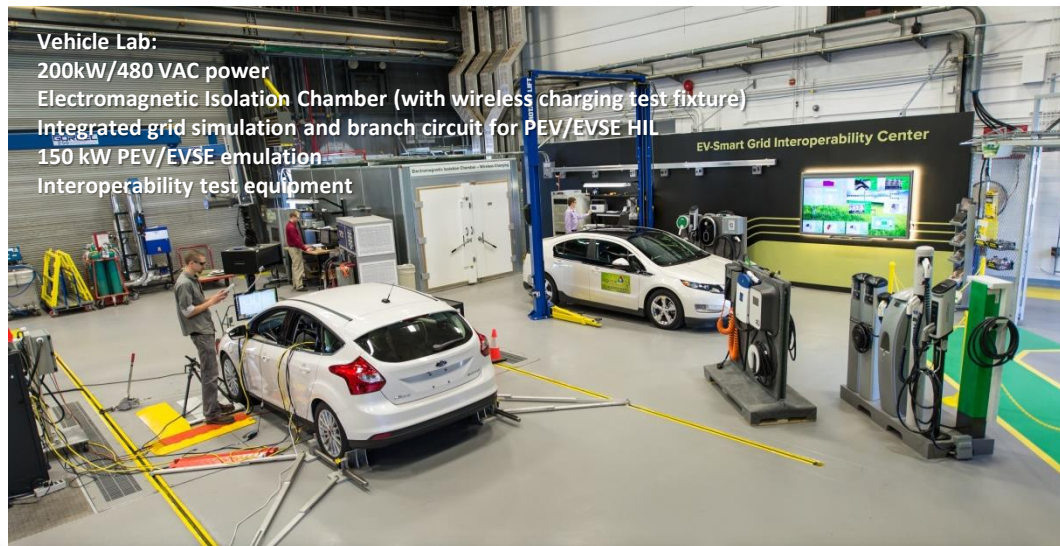
Leveraged established vehicle and embedded controls labs:

Charging Systems: AC, DC, wireless, balance of system/grid interface

Communications Technologies: Software, embedded systems, messaging protocols

Networks: Infrastructure-related systems

Vehicle and Component Testing



Advanced Powertrain Research
Facility
PEV and HV testing
4WD dynamometer
Multi-fuel capability
Thermal testing



Embedded Controls Lab



Charging Systems
Lab



Campus charging network

Argonne National Laboratory

EV-Smart Grid Interoperability Center

Test procedures and tools

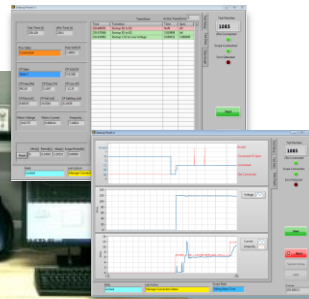
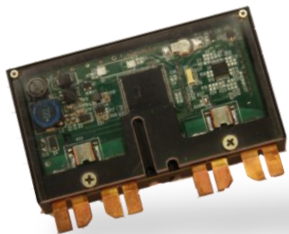
- PEV-EVSE Interoperability (SAE J2953)
- Connector force measurement (SAE J1772)
- Wireless charging test fixture (SAE J2954)

Charging communication controllers

- PEV/EVSE communication and emulation

Compact metrology

- Smart sub-meter with communication



JRC-Institute for Energy & Transport

Integrated European EV/Smart Grid Reference Laboratory



X-ray CT of battery



Ispira, IT - Vehicle testing and ICT

Petten, NL - Battery, component, materials, smart grids

Vehicle and Engine Emissions Laboratories (VELA): Testing all types of vehicles/engines; legislative and realistic conditions.

EV-EVSE compatibility/interoperability: Connectivity and functionality to ensure safety and code compliance.

EV component and battery testing: Performance and safety validation under typical and abusive operating conditions.

Smart grid simulation: Offline/real-time simulation and component testing; interoperability and communications; mobile lab and field testing; visualization and interaction.

Combine interoperability efforts in EU & US

- Create a universal interoperability vision and strategy for implementation
- Develop and verify technology and test standards, methods and equipment
- Specify a 'global' AC/DC test device



Evaluating 'man-in-the-middle' test equipment

Combined test matrix being developed includes SAE J2953 and proposed ISO 15118 interoperability standards

[illegible]

Opportunity ...

China-US MOU on Electric Vehicle Cooperation

U.S. Secretary of Energy Ernest Moniz and Minister Miao Wei of the Chinese Ministry of Industry and Information Technology signed a MOU for cooperation on electric vehicles and industrial energy efficiency.

Under this framework, the two sides will conduct cooperation in the fields of electric vehicles and related technologies, as well as energy efficiency improvement for end use products.

Secretary Moniz and Minister Miao agreed on the importance of expanding joint work to promote efficient industrial use of energy and inter-operability of electric vehicles.

US DOE press release – July 11, 2014



HARMONIZATION OF STANDARDS, TECHNOLOGY AND TESTING

EV-Smart Grid Interoperability Centers in Europe and the U.S.

Cooperative Activity on EV-Grid Integration

- Argonne National Laboratory (ANL)
- Idaho National Laboratory (INL)
- Lawrence Berkeley National Laboratory (LBNL)
- National Renewable Energy Laboratory (NREL)
- Oakridge National Laboratory (ORNL)
- Pacific Northwest National Laboratory (PNNL)